Remarks

The Applicant has cancelled Claims 1–6 and has added new Claims 16–29. Therefore Claims 16–29 are currently pending in this application. Claims 16 and 27 are independent.

Claim Objections

The Examiner has objected to Claim 1 due to informalities. The Applicant has cancelled Claim 1, and therefore respectfully requests that the claim objections be withdrawn.

Claim Rejections Under 35 U.S.C. § 103(a)

The Examiner has rejected Claims 1 and 2 under 35 U.S.C. § 103(a) as being obvious based on U.S. Patent Application Publication 2003/0170540 ("Ohzuku"). The Applicant has cancelled Claims 1 and 2, and therefore respectfully requests that these rejections be withdrawn.

The Examiner has rejected Claims 3–5 under 35 U.S.C. § 103(a) as being obvious based on Ohzuku in view of U.S. Patent Application Publication 2002/0164527 ("Tanigawa"). The Applicant has cancelled Claims 3–5, and therefore respectfully requests that these rejections be withdrawn.

The Examiner has rejected Claim 6 under 35 U.S.C. § 103(a) as being obvious based on Ohzuku in view of Tanigawa and U.S. Patent 6,071,489 ("Sun"). The Applicant has cancelled Claim 6, and therefore respectfully requests that these rejections be withdrawn.

New Claims 16–29

The Applicant has added new Claims 16–29. These claims recite methods for preparing a composite cathode active material for a lithium secondary battery. These methods are all disclosed in the originally-filed application disclosure. No new matter has been added. The method recited in Claims 16–29 are novel and nonobvious based on the art of record. New Claims 16 and 27 are independent.

For example, new independent Claim 16 recites a method that includes a combination of procedures, including producing first and second lithium metal composite oxides which are mixed to form a composite cathode active material. The first lithium metal composite oxide has a mean particle diameter that is less than 90% of a mean particle diameter of the second lithium metal composite oxide. As pointed out in the originally-filed application disclosure, this arrangement advantageously allows the chargeability of the composite cathode active material to be improved, and thus allows the electrode capacity to be increased. See, for example, page 9, paragraph 38 of the originally-filed application disclosure. The art of record does not disclose the method recited in independent Claim 16.

New dependent Claims 17–26 further define the method of independent Claim 16 by reciting additional features that are not disclosed in the art of record. For example, dependent Claim 17 more specifically defines the particle diameter distributions for the first and second lithium metal composite oxides, and specifically recites that a secondary particle has a mean particle diameter distribution between about 1 μm and about 20 μm when the primary particles are aggregated to form the secondary particles. The parameters recited in Claim 17 are disclosed, for example, in Table 1 of the originally-filed application disclosure (see Example 4). Ohzuku actually **teaches away** from such a particle diameter distribution, indicating that "large spherical particles having a size exceeding 10 μm tend to remain on the bottom of the reaction bath and thus are less easily taken out and, for this reason, care must be taken **not** to form such large size particles" (emphasis added). See Ohzuku at Paragraph **[0092]**.

As another example of a dependent claim reciting additional features not disclosed in the art of record, dependent Claim 21 recites that the first and second mixtures of metal precursor, aqueous ammonia solution and basic solution are exposed to ultrasonic energy. As pointed out in the originally-filed application disclosure, exposure to ultrasonic energy advantageously promotes growth of dense nickel, manganese and cobalt hydroxides. See, for example, page 8, paragraph 36 of the originally-filed application disclosure. The art of record does not disclose use of ultrasonic energy.

New independent Claim 27 also recites a method that includes a combination of procedures, including producing first and second lithium metal composite oxides which are mixed to form a composite cathode active material. However, while independent Claim 16 recites a method wherein the first and second lithium metal composite oxides may have the same chemical composition (indeed, this is expressly recited in dependent Claim 19), new independent Claim 27 recites a method wherein the first and second lithium metal composite oxides are different. Specifically, Claim 27 recites that the first lithium metal composite oxide has a formula $LiNi_{1-x'-y}Co_{x'}M'_yO_2P_z$, while the second lithium metal composite oxide has a formula selected from the group consisting of $Li_{1+\delta}[Ni_xMn_{x-y/2}Co_{1-2x-z}M_yN_z]O_{2-a}P_a$ and $Li_{1+\delta}[Ni_xMn_{x+y}Co_{1-2(x+y)}M_y]O_{2-a}P_a$. The parameters M, M′, N, P, δ, x, x', y, z and a are defined in the claim. As pointed out in the originally-filed application disclosure, use of $LiNi_{1-x'-y}Co_{x'}M'_yO_2P_z$ advantageously increases electron conductivity or capacity and improves high-rate and low temperature characteristics of the lithium secondary battery. See, for example, page 9, paragraph 39 of the originally-filed application disclosure. The art of record does not disclose the use of $LiNi_{1-x'-y}Co_{x'}M'_yO_2P_z$ as a first lithium metal composite oxide, in contrast to use of $Li_{1+\delta}[Ni_xMn_{x-y/2}Co_{1-2x-z}M_yN_z]O_{2-a}P_a$ or $Li_{1+\delta}[Ni_xMn_{x+y}Co_{1-2(x+y)}M_y]O_{2-a}P_a$ as a second lithium metal composite oxide.

New dependent Claim 29 further defines the method of independent Claim 16 by reciting additional features that are not disclosed in the art of record. For example, dependent Claim 29 more specifically defines that the reactor has a structure in which rotary vanes are designed in a reverse vane type, and baffles are spaced apart from the inner wall of the reactor, the baffles having a shape of a flat panel and being attached to the inner wall by connecting rods. The baffles of Claim 29 control the wave strength and concentration and enhance turbulent effects so as to solve local ununiformity of a reaction liquor (see paragraph [34], page 7 of the Specification) where the recited baffle of Claim 29 must affect the method in a manipulative sense, not to amount to the mere claiming of a use of a particular structure. Furthermore, it is more efficient to have a plurality of baffles of Claim 29 which are connected to the inner wall by connecting rods to allow liquid material passing through gaps between the inner wall and the baffles.

Based on the foregoing, the Applicant respectfully submits that new independent Claims 16–29 are allowable over the art of record, and respectfully requests that such claims be allowed.

No Disclaimers or Disavowals

Although this communication may include amendments to the application, and may characterize the claim scope and/or referenced art, the Applicant does not concede that previously pending claims are not patentable over the cited references. Rather, any amendments and/or characterizations are being made to facilitate expeditious prosecution of this application. The Applicant reserves the right to later pursue any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history cannot reasonably infer that the Applicant has made any disclaimers or disavowals of any subject matter supported by the present disclosure.

Conclusion

In view of the foregoing, this application is believed to be in condition for allowance, and such allowance is respectfully requested. Should the Examiner believe that a telephone conference or personal interview would facilitate resolution of any remaining matters, the Examiner may contact the Applicant's attorney at the number given below.

The Commissioner is authorized (a) to charge LEXYOUME's Deposit Account No. 504054 for any fees required under 37 C.F.R. §§ 1.16 and 1.17 that are not covered, in whole or in part, by a credit card payment form submitted herewith, and (b) to credit any overpayment to said Deposit Account No. 504054.

Respectfully submitted,

/jwkim/

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